IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appln. No.:	10/797,297	:	Confirmation No.: 4437
Appellants:	Ajith K. Kumar	:	Group Art Unit: 3664
Filed:	March 9, 2004	:	Examiner: Jen, Mingjen
Docket No.:	20-LC-2057-2		

For: METHOD FOR DETERMINING THE ROTATIONAL VELOCITY OF AN AXLE AND DETECTING A LOCKED AXLE CONDITION

February 27, 2009

Board of Patent Appeals and Interferences
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDED APPEAL BRIEF

This Appeal Brief is amended to include the following sub-headings in Section VII. ARGUMENT in response to the Office communication dated January 30, 2009:

Claims 1-2, 5-15 and 25-32 are patentable under 35 U.S.C. §103(a) over Obara et al. in view of Becerra.

Claims 3 and 4 are patentable under 35 U.S.C. §103(a) over Obara et al. in view of Becerra and further in view of Balch.

Claims 16-20 and 22-24 are patentable under 35 U.S.C. §103(a) over Obara et al. in view of Becerra and further in view of Kumar et al.

Claim 21 is patentable under 35 U.S.C. §103(a) over Obara et al. in view of Becerra and further in view of Discenzo.

These sub-headings correspond to the grounds of rejection presented by the Examiner in the Final Office Action dated July 24, 2008 and represent each grounds of rejection to be reviewed separately. Arguments are organized in accordance with these sub-headings.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is General Electric Company, the assignee of record.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to Appellant, Appellant's legal representatives, or assignee that will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF THE CLAIMS

Claims 1-32 are pending in the application and stand finally rejected. Claims 1-32, as they currently stand, are set forth in Section VIII. Appellants hereby appeal the final rejection of Claims 1-32.

IV. STATUS OF THE AMENDMENTS

No amendments were filed subsequent to the final rejection. All prior amendments have been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claims 1 and 29-32 are independent claims. A summary of the subject matter presented in each of the independent claims and dependent claims argued in the appeal is provided with reference to the specification and drawings. It is understood that the reference to the specific embodiments in the specification and drawings is provided for reasons relating to this appeal and is not intended to limit the scope of the claims.

Claim 1

Claim 1 is directed to a method for detecting a rotational velocity of a traction motor in a vehicle [para. 0028]. The method includes obtaining a traction motor signal having at least one phase [para. 0028; para. 0029; FIG. 2 (step 16)], wherein said traction motor signal is responsive to an operating condition of said traction motor in an electrically unexcited state [para. 0027]. The method further includes processing said traction motor signal to create an indication result

based on a frequency of said of said traction motor signal [para. 0030; FIG. 2 (step 12)]. The method further includes determining rotational velocity of said traction motor based on said indication result [para. 0030].

No means plus function terminology is included.

Claim 6

Claim 6 is a dependent claim depending from claim 1. Claim 6 includes the further limitation of "converting said traction motor signal into a two-phase signal responsive to said traction motor signal." [para. 0032]

No means plus function terminology is included.

Claim 15

Claim 15 is a dependent claim depending from claim 1. Claim 15 includes the further limitation of "wherein processing said traction motor signal includes isolating a single phase of said traction motor signal." [para. 0038 and FIG. 4 (step 28)]

No means plus function terminology is included.

Claim 17

Claim 17 is a dependent claim depending from claim 16. Claim 17 includes the further limitation of "applying said rectified signal to a low pass filter so as to create an indication result responsive to the magnitude of said phase of said traction motor signal." [para. 0034 and step 32 in Figure 4]

No means plus function terminology is included.

Claim 22

Claim 22 is a dependent claim depending from claim 15. Claim 22 includes the further limitation of "obtaining a vehicle data signal and applying said single phase of said traction motor signal to a band pass filter so as to create a band pass output signal responsive to said vehicle data signal." [para. 0042 and step 42 in Figure 5]

No means plus function terminology is included.

Claim 24

Claim 24 is a dependent claim depending from claim 23. Claim 24 includes the further limitation of "applying said rectified signal to a low pass filter so as to create said indication result wherein said indication result is responsive to the magnitude and frequency of said frequency of said single phase of said traction motor signal." [para. 0043 and step 46 in Figure 5]

No means plus function terminology is included.

Claim 28

Claim 28 is a dependent claim depending from claim 1. Claim 28 includes the further limitation of "wherein said traction motor signal is based on a voltage generated by a residual flux in said traction motor when rotated by movement of said vehicle." [para. 0027]

No means plus function terminology is included.

Claim 29

Claim 29 is directed to a data storage medium including instructions encoded in a computer readable form for causing a computer to implement a process [para. 0050] for detecting a rotational velocity of a traction motor in a vehicle [para. 0028]. The process includes obtaining a traction motor signal having at least one phase [para. 0028; para. 0029; FIG. 2 (step 16)], wherein said traction motor signal is responsive to an operating condition of said traction motor in an electrically unexcited state [para. 0027]. The process further includes processing said traction motor signal to create an indication result based on a frequency of said of said traction motor signal [para. 0030; FIG. 2 (step 12)]. The process further includes determining rotational velocity of said traction motor based on said indication result [para. 0030].

No means plus function terminology is included.

Claim 30

Claim 30 is directed to a computer data signal encoded in a computer readable medium, said data signal comprising code configured to direct a computer to implement a process [para. 0050] for detecting a rotational velocity of a traction motor in a vehicle [para. 0028]. The process includes obtaining a traction motor signal having at least one phase [para. 0028; para. 0029; FIG. 2 (step 16)], wherein said traction motor signal is responsive to an operating

condition of said traction motor in an electrically unexcited state [para. 0027]. The process further includes processing said traction motor signal to create an indication result based on a frequency of said of said traction motor signal [para. 0030; FIG. 2 (step 12)]. The process further includes determining rotational velocity of said traction motor based on said indication result [para. 0030].

No means plus function terminology is included.

Claim 31

Claim 31 is directed to a computer processor on a vehicle for performing a process [para. 0049; para. 0050] for detecting a rotational velocity of a traction motor in a vehicle [para. 0028]. The process includes obtaining a traction motor signal having at least one phase [para. 0028; para. 0029; FIG. 2 (step 16)], wherein said traction motor signal is responsive to an operating condition of said traction motor in an electrically unexcited state [para. 0027]. The process further includes processing said traction motor signal to create an indication result based on a frequency of said of said traction motor signal [para. 0030; FIG. 2 (step 12)]. The process further includes determining rotational velocity of said traction motor based on said indication result [para. 0030].

No means plus function terminology is included.

Claim 32

Claim 32 is directed to a system for detecting a rotational velocity of a traction motor in a vehicle [para. 0028]. The system includes a traction motor [para. 0028] generating a traction motor signal having at least one phase [para. 0029], wherein said traction motor signal is responsive to an operating condition of said traction motor in an electrically unexcited state [para. 0027]. The system further includes a voltage sensor [para. 0028; para. 0029; FIG. 1 (element 4)]] configured to generate a signal indicative of a voltage generated by residual flux in said traction motor when rotated by movement of said vehicle [para. 0027; para. 0029] with said traction motor in an electrically unexcited state [para. 0027]. The system further includes a controller [para. 002; para. 0039; FIG. 1 (element 6)] in operable communication with at least one of said traction motor and said signal, and thereby create an indication result responsive to a

frequency of said traction motor and indicative of rotational velocity of said traction motor [para. 0030].

No means plus function terminology is included.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-2, 5-15 and 25-32 stand rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Obara et al. (U.S. Patent No. 5,661,380 hereinafter Obara et al.) in view of Becerra (Four Quadrant Sensorless Brushless ECM Drive; CH2992-6/91/0000-0202, IEEE hereinafter Becerra). (Please note that the Final Office Action dated July 24, 2008 states on page 2 that these claims are rejected under 35 U.S.C. 102(b), however the law presented immediately above that statement is 35 U.S.C. 103(a).)

Claims 3 and 4 stand rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Obara et al. in view of Becerra and further in view of Balch et al. (U.S. Patent No. 6,758,087). (Please note that the Final Office Action dated July 24, 2008 states on page 10 that these claims are rejected under 35 U.S.C. 102(b), however the law presented on page 2 is 35 U.S.C. 103(a).)

Claims 16-20 and 22-24 stand rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Obara et al. in view of Becerra and further in view of Kumar et al. (U.S. Patent No. 5,992,950).

Claim 21 stands rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Obara et al. in view of Becerra and further in view of Discenzo (U.S. Patent No. 6,326,758)

VII. ARGUMENT

Claims 1-2, 5-15 and 25-32 are patentable under 35 U.S.C. §103(a) over Obara et al. in view of Becerra.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from

the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

Dependent claims inherit all of the limitations of the parent claim.

Claims 1-2, 5-15 and 25-32

Claims 1 and 29-32 are independent claims. Claims 2, 5-15 and 25-28 depend from claim 1.

Independent claim 1 recites "A method for detecting a rotational velocity of a traction motor in a vehicle comprising:

[a] obtaining a traction motor signal having at least one phase, wherein said traction motor signal is responsive to an operating condition of **said traction motor in an electrically unexcited state**;

[b] processing said traction motor signal to create an indication result **based on a frequency of said traction motor signal**; and

[c] determining rotational velocity of said traction motor based on said indication result. (element descriptors and emphasis added)

The Specification of the present Application provides clarification of "**said traction motor in an electrically unexcited state**." Paragraph 0008 states, "there are many operating conditions of a locomotive when an excitation voltage is not available. For example, when the engine is not running, or when the locomotive is in isolated mode such that the alternator cannot produce voltage."

With respect to element [a], neither Obara et al. nor Becerra discloses or suggests "obtaining a traction motor signal having at least one phase, wherein said traction motor signal is responsive to an operating condition of **said traction motor in an electrically unexcited state**" as the Appellant claims in claim 1. The Examiner agrees with the Appellant with respect to Obara et al. not disclosing or suggesting element [a] of claim 1. The Examiner states on page 3 (lines 7-80 of the Final Office Action dated July 24, 2008, "Obara et al. in view of Balch does not show motor signal is responsive to motor in electrically unexcited state."

Turning now to Becerra, Becerra teaches "**rotor position** information can be developed without discrete position sensors by processing motor terminal voltage and/or current

waveforms. Electronically-Commutated Motor (ECM) drives using PM [permanent magnet] motors with trapezoidal magnet MMF distributions (also known as brushless DC motor drives) provide attractive candidates for such indirect sensing since only two of the three **motor phases** are excited at any time instant." (See Becerra Introduction, second paragraph, emphasis added.) Inherent in having "only two of the three motor phases … excited at any time instant" in the brushless DC motor drive is that the motor be excited. The "two of the three motor phases … excited at any time instant" require that the motor be in an electrically excited state. Nowhere does Becerra teach operating the brushless DC motor drive in an electrically unexcited state because "two of the three motor phases are excited at any time instant."

The Examiner's remarks in the Office Action dated January 24, 2008 (page 11) that "Becerra shows motor signal is responsive to motor in an electrically unexcited state (Col. 1, Introduction, where the sensor is used to measure the EMF voltage in motor unexcited phase)" implies that a motor with one unexcited phase is the same as the motor being in an electrically unexcited state. The Appellant responded to this Office Action with the arguments in the preceding paragraph (i.e., Becerra teaches rotor position. Inherent in having "only two of the three motor phases … excited at any time instant" in the brushless DC motor drive is that the motor be excited. The "two of the three motor phases … excited at any time instant" require that the motor be electrically excited).

In the Final Action dated July 24, 2008 (page 3), the Examiner merely repeats the same comments made in the prior Office Action without specifically addressing how a motor in which two of three phases are excited at any instant is a motor in an electrically unexcited state. The Examiner mistakenly equates one unexcited phase of a brushless DC motor with an unexcited motor. In addition, the Examiner does not address why one skilled in the art at the time of the invention would be motivated to determine rotational velocity of a traction motor from the teaching of Becerra, which teaches determining **rotor position** for electrical commutation purposes in a brushless DC motor. (See Becerra Introduction, second paragraph.)

With respect to element [b] of claim 1, neither Obara et al. nor Becerra disclose or suggest "processing said traction motor signal to **create** an indication result **based on a frequency of said traction motor signal**" as the Appellant claims in claim 1. Rather, Obara et al. teach, "In the normal state, the controller 5 **receives** rotating speed N of the motor." (emphasis added) Nowhere do Obara et al. teach that the "rotating speed N of the motor" is "an

indication result **based on a frequency of said traction motor signal**." With respect to Becerra, the second paragraph (line 11) of the introduction section teaches "determining ECM inverter commutation instants." In addition, Becerra teaches in the second paragraph (lines 13-14) of section 3.1, "The selected phase voltage equals the desired back-EMF voltage needed for **position sensing**." Nowhere does Becerra teach that the "ECM inverter commutation instants" are "an indication result **based on a frequency of said traction motor signal**."

In the Final Office Action dated July 24, 2008 (page 3), the Examiner states that Obara et al. shows element [b], "processing said traction motor signal to create an indication result **based on a frequency of said traction motor signal** (Column 3, lines 63 – Column 4, lines 13; Fig. 1, primary frequency command generating means 20; alternating current command generating means 80, PWM signal generating means 90)." A review of the Examiner's citations reveals that Obara et al. teach "receiv[ing] rotating speed N of the motor" (column 3, lines 60-61); "The primary frequency command generating means 20 calculates a primary angular frequency" (column 3, lines 64-66); "In alternating current command calculating means 80 standard signals … are generated … using the primary angular frequency" (column 4, lines 6-10); and "a PWM signal is output from the PWM signal generating means 90" (column 4, lines 11-12). In other words, Obara et al. teach **receiving** the rotating speed N of the motor and generating signals from the rotating speed N. In contrast, the claimed invention **determines** rotational velocity of a traction motor by "processing said traction motor signal to create an indication result **based on a frequency of said traction motor signal**."

With respect to element [c] of claim 1, neither Obara et al. nor Becerra disclose or suggest "determining rotational velocity of said traction motor based on said indication result" as the Appellant claims in claim 1. Rather, Obara et al. teach "receiv[ing] rotating speed N of the motor." (column 3, lines 60-61) Obara et al. do not disclose or suggest actually determining the rotating speed N, only receiving the rotating speed N. With respect to Becerra, Becerra teaches determining rotor position for electrical commutation purposes in a brushless DC motor. (See Becerra Introduction, second paragraph.) Nowhere does Becerra disclose or suggest determining rotational velocity in the brushless DC motor.

In the Final Office Action dated July 24, 2008 (page 3, lines 4-7), the Examiner states that Obara et al. shows element [c], "determining rotational velocity of traction motor based on indication result (See Fig 1, three phase alternating current motor 4, speed sensor 6, current

sensor 7, accelerator sensor 8, rotating angular speed detecting means 10; Column 3, lines 30-50)." A review of each of these citations reveals that Obara et al. teach: the speed sensor 6 "is a speed sensor for detecting the rotating speed N of the motor 4"; the current sensor 7 "detects the primary current ... of the three-phase alternating current flowing the primary winding of the alternating current motor 4"; the accelerator sensor 8 "is an accelerator sensor for outputting an output θA corresponding to the degree of stepping-in when the accelerator pedal is stepped"; and the rotating angular speed detecting means 10 is part of the controller 5. None of these citations discloses or suggests "determining rotational velocity of said traction motor based on said indication result [obtained from element[c]]." In contrast to the present Application, Obara et al. provides no teaching as to how the speed sensor 6 or the rotating angular speed detecting means 10 actually determines the rotating speed N or rotating angular speed. The current sensor 7 is shown connected to current control means 70 in FIG. 1. There is no teaching in Obara et al. that the current control means 70 determines the rotating speed N or rotating angular speed. The accelerator sensor 8 is shown connected to the accelerator opening calculating means 31 in FIG. 1. There is no teaching in Obara et al. that the accelerator sensor 8, which measures the degree to which the accelerator pedal is depressed, is used to determine rotational velocity of the alternating current motor 4.

For at least the reasons presented above with respect to elements [a], [b] and [c], Appellant respectfully submits that the Examiner has failed to establish a prima facie case of obviousness by failing to show where Becerra contain some suggestion or incentive that would have motivated the skilled artisan to modify the disclosure of Obara et al, and therefore requests withdrawal of the obviousness rejection under 35 U.S.C. 103(a) and allowance of claim 1 and the claims dependent thereon.

Further Argument Claim 6

Claim 6 is a dependent claim depending from claim 1. Claims 7-14 depend from claim 6. Claim 6 includes the further limitation of "converting said traction motor signal into a two-phase signal responsive to said traction motor signal." Neither Obara et al. nor Becerra disclose or suggest "converting said traction motor signal into a two-phase signal responsive to said traction motor signal" as the Appellant claims in claim 6. Rather Obara et al. teaches, as cited by the Examiner in the Final Office Action dated July 24, 2008 (page 4), "In the running back-up

control circuit 40 it is judged whether each of the sensors is normal or not. As for the speed sensor 6, the two outputs 6a and 6b are compared, and if there is no substantial difference between them, it is judged to be normal." (column 4, lines 18-22) As this citation shows, outputs 6a and 6b are separate outputs that are compared to each other to determine if a normal condition exists. Because these two outputs are separate, they cannot be a two-phase signal.

For at least these reasons, the Appellant respectfully submits that the Examiner has failed to establish a prima facie case of obviousness by failing to show where either Obara et al. or Becerra contains some suggestion or incentive that would have motivated the skilled artisan to modify Obara et al. to obtain "converting said traction motor signal into a two-phase signal responsive to said traction motor signal", and therefore requests withdrawal of the obviousness rejection under 35 U.S.C. 103(a) and allowance of claim 6 and the claims dependent thereon.

Further Argument Claim 15

Claim 15 is a dependent claim depending from claim 1. Dependent claims 16-20 and 22-24 each depend from claim 15. Claim 15 includes the further limitation of "wherein processing said traction motor signal includes isolating a single phase of said traction motor signal." Neither Obara et al. nor Becerra disclose or suggest "wherein processing said traction motor signal includes isolating a single phase of said traction motor signal" as the Appellant claims in claim 15. Rather, the Examiner states in the Final Office Action dated July 24, 2008 (page 5), "Becerra show processing traction motor signal includes isolating a single phase of traction motor signal (Col 1, Introduction, where only two of the three phases motor is excited, left a single phase of motor isolated)." To the contrary, Becerra teaches that one phase is unexcited **at any time instant**. (See Becerra, Introduction, second paragraph) Becerra does not disclose or suggest "isolating a single phase" because the one phase that is unexcited is continually changing excitation (i.e. becoming excited), over time. That is, not one specific phase remains unexcited, but continually changes excitation. Paragraph 0038 of the present Application provides clarification teaching "a traction motor signal [i.e., three-phase signal] is obtained … and a single phase of the traction motor signal is isolated as in step 28 [shown in FIG. 4]."

For at least these reasons, the Appellant respectfully submits that the Examiner has failed to establish a prima facie case of obviousness by failing to show where Becerra contains some suggestion or incentive that would have motivated the skilled artisan to modify Obara et al. to

obtain "wherein processing said traction motor signal includes isolating a single phase of said traction motor signal.", and therefore requests withdrawal of the obviousness rejection under 35 U.S.C. 103(a) and allowance of claim 15 and the claims dependent thereon.

Further Argument Claim 28

Claim 28 is a dependent claim depending from claim 1. Claim 28 includes the further limitation of "wherein said traction motor signal is based on a voltage generated by a residual flux in said traction motor when rotated by movement of said vehicle." Neither Obara et al. nor Becerra disclose or suggest "wherein said traction motor signal is based on a voltage generated by a residual flux in said traction motor when rotated by movement of said vehicle" as the Appellant claims in claim 28. The Examiner states in the Final Office Action dated July 24, 2008 (page 6), "Obara et al. shows traction motor signal is based on a voltage generated by a residual flux in traction motor when rotated by movement of vehicle (Column 4, lines 41 – Column 5, lines 35)." A review of this citation shows that Obara et al., in contrast to the present Application do not teach any residual flux let alone a voltage generated by a residual flux in the motor 4. In addition, because Obara et al. do not disclose or suggest a traction motor in an unexcited state (as stated by the Examiner on page 3, lines 7-8, of the Final Office Action), Obara et al. cannot teach residual flux in the motor 4 that is excited.

For at least these reasons, the Appellant respectfully submits that the Examiner has failed to establish a prima facie case of obviousness by failing to show where Becerra contains some suggestion or incentive that would have motivated the skilled artisan to modify Obara et al. to obtain "wherein processing said traction motor signal includes isolating a single phase of said traction motor signal.", and therefore requests withdrawal of the obviousness rejection under 35 U.S.C. 103(a) and allowance of claim 28.

Claims 29-31

Independent claims 29-31 use claim language similar to the claim language of claim 1. Therefore, the Appellant respectfully submits that the Examiner has failed to establish a prima facie case of obviousness for claims 29-31 for the reasons presented above with respect to claim 1, and therefore requests withdrawal of the obviousness rejections under 35 U.S.C. 103(a) and allowance of these claims.

Claim 32

Independent claim 32 recites: "A system for detecting a rotational velocity of a traction motor in a vehicle comprising:

[a] a traction motor generating a traction motor signal having at least one phase, wherein said traction motor signal is responsive to an operating condition of said traction motor in an electrically unexcited state;

[b] a voltage sensor configured to generate a signal indicative a voltage generated by residual flux in said traction motor when rotated by movement of said vehicle with said traction motor in an electrically unexcited state; and

[c] a controller in operable communication with at least one of said traction motor and said voltage sensor configured to process said traction motor signal and said signal, and thereby create an indication result responsive to a frequency of said traction motor signal and indicative of rotational velocity of said traction motor." (element descriptors added)

With respect to element [a] of claim 32, the arguments presented above for element [a] of claim 1 are applicable. That is, neither Obara et al. nor Becerra disclose or suggest a "traction motor in an electrically unexcited state" as the Appellant claims in claim 32.

With respect to element [b] of claim 32 neither Obara et al. or Becerra disclose or suggest "a voltage sensor configured to generate a signal indicative a voltage generated by residual flux in said traction motor when rotated by movement of said vehicle with said traction motor in an electrically unexcited state" as the Appellant claims in claim 32. Because neither Obara et al. nor Becerra disclose or suggest a traction motor in an electrically unexcited state as explained above with respect to element [b] of claim 1, neither Obara et al. nor Becerra disclose or suggest "a voltage sensor configured to generate a signal indicative a voltage generated by residual flux in said traction motor."

With respect to element [c] of claim 32, neither Obara et al. nor Becerra disclose or suggest "a controller in operable communication with at least one of said traction motor and said voltage sensor configured to process said traction motor signal and said signal, and thereby

create an indication result responsive to a frequency of said traction motor signal and indicative of rotational velocity of said traction motor" as the Appellant claims in claim 32. As explained above with respect to element [b] of claim 1, neither Obara et al. nor Becerra disclose or suggest "an indication result responsive to a frequency of said traction motor signal." In addition, as explained above with respect to element [c] of claim 1, neither Obara et al. nor Becerra disclose or suggest "an indication result" "indicative of rotational velocity of said traction motor." Thus, neither Obara et al. nor Becerra disclose or suggest a controller configured to "create an indication result responsive to a frequency of said traction motor signal and indicative of rotational velocity of said traction motor."

For at least these reasons, Appellant respectfully submits that that the Examiner has failed to establish a prima facie case of obviousness, and therefore requests withdrawal of the obviousness rejection under 35 U.S.C. 103(a) and allowance of the claim 32.

Claims 3 and 4 are patentable under 35 U.S.C. §103(a) over Obara et al. in view of Becerra and further in view of Balch.

Claims 3 and 4 depend from independent claim 1. The Appellant respectfully submits that claims 3 and 4 should be allowed with the allowance of claim 1.

Claims 16-20 and 22-24 are patentable under 35 U.S.C. §103(a) over Obara et al. in view of Becerra and further in view of Kumar et al.

Claims 16, 18-19 and 22 depend from claim 15. Claim 17 depends from claim 16. Claim 20 depends from claim 1. Claim 23 depends from claim 22, and claim 24 depends from claim 23. The Appellant respectfully submits: claims 16, 18-19 and 22 should be allowed with the allowance of either claim 1 or claim 15; claim 17 should be allowed with the allowance of either claim 1, claim 15 or claim 16; claim 20 should be allowed with the allowance of claim 1; claim 23 should be allowed with the allowance of claim 22; and claim 24 should be allowed with the allowance of claim 23.

Claim 17

Claim 17 depends from claim 16. Claim 17 includes the further limitation of "applying said rectified signal to a **low pass filter** so as to create an indication result responsive to the

magnitude of said phase of said traction motor signal." (emphasis added) Nowhere do Kumar et al. disclose or suggest "applying said rectified signal to a **low pass filter** so as to create an indication result responsive to the magnitude of said phase of said traction motor signal" as the Appellant claims in claim 17. In fact, Kumar et al. do not disclose or suggest any "low pass filter." The Examiner cites column 3, lines 42-47 and column 4 , lines 20-27 in Kumar et al. as disclosing the limitation of claim 17. These citations do not disclose or suggest a low pass filter.

For at least these reasons, Appellant respectfully submits that that the Examiner has failed to establish a prima facie case of obviousness, and therefore requests withdrawal of the obviousness rejection under 35 U.S.C. 103(a) and allowance of the claim 17.

Claim 22

Claim 22 depends from claim 15. Claim 22 includes the further limitation of "obtaining a vehicle data signal and applying said single phase of said traction motor signal to a **band pass filter** so as to create a band pass output signal responsive to said vehicle data signal." (emphasis added) Nowhere do Kumar et al. disclose or suggest "obtaining a vehicle data signal and applying said single phase of said traction motor signal to a **band pass filter** so as to create a band pass output signal responsive to said vehicle data signal" as the Appellant claims in claim 22. In fact Kumar et al. do not disclose or suggest any "band pass filter." Rather, Kumar et al. disclose "vehicle speed signal is coupled to a lead-lag filter 112." (column 8, lines 13-14) The Appellant respectfully asserts that the lead-lag filter disclosed in Kumar et al. is not a band pass filter.

For at least these reasons, Appellant respectfully submits that that the Examiner has failed to establish a prima facie case of obviousness, and therefore requests withdrawal of the obviousness rejection under 35 U.S.C. 103(a) and allowance of the claim 22.

Claim 24

Claim 24 depends from claim 23. Claim 24 includes the further limitation of "applying said rectified signal to a **low pass filter** so as to create said indication result wherein said indication result is responsive to the magnitude and frequency of said frequency of said single phase of said traction motor signal." (emphasis added) Nowhere do Kumar et al. disclose or suggest "applying said rectified signal to a **low pass filter** so as to create said indication result

wherein said indication result is responsive to the magnitude and frequency of said frequency of said single phase of said traction motor signal" as the Appellant claims in claim 24. In fact, Kumar et al. do not disclose or suggest any "low pass filter." The Examiner cites column 3, lines 42-47 and column 4 , lines 20-27 in Kumar et al. as disclosing the limitation of claim 24. These citations do not disclose or suggest a low pass filter.

For at least these reasons, Appellant respectfully submits that that the Examiner has failed to establish a prima facie case of obviousness, and therefore requests withdrawal of the obviousness rejection under 35 U.S.C. 103(a) and allowance of the claim 24.

Claim 21 is patentable under 35 U.S.C. §103(a) over Obara et al. in view of Becerra and further in view of Discenzo.

Claim 21 depends from claim 15. The Appellant respectfully submits that claim 21 should be allowed with the allowance of claim 15.

In summary, claims 1-32 are patentable over the art of record. For the reasons stated above, Appellant respectfully submits that all of the claims are allowable and the application is in condition for allowance. Appellant respectfully requests reversal of the outstanding rejections and allowance of this application.

In the event the Examiner has any queries regarding the submitted arguments, the undersigned respectfully requests the courtesy of a telephone conference to discuss any matters in need of attention.

If there are any additional charges with respect to this Appeal Brief, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

Claim 1. A method for detecting a rotational velocity of a traction motor in a vehicle comprising:

obtaining a traction motor signal having at least one phase, wherein said traction motor signal is responsive to an operating condition of said traction motor in an electrically unexcited state;

processing said traction motor signal to create an indication result based on a frequency of said traction motor signal; and

determining rotational velocity of said traction motor based on said indication result.

Claim 2. The method of claim 1, further comprising obtaining a vehicle data signal.

Claim 3. The method of claim 2, wherein said vehicle includes an additional traction motor, and said vehicle data signal includes a reference speed signal responsive to a rotational velocity of said additional traction motor.

Claim 4. The method of claim 3, wherein said vehicle data signal includes a reference speed tolerance.

Claim 5. The method of claim 2, wherein said processing said traction motor signal includes proceeding with said processing responsive to said vehicle data signal.

Claim 6. The method of claim 1, further comprising converting said traction motor signal into a two-phase signal responsive to said traction motor signal.

Claim 7. The method of claim 6, wherein said processing includes applying said two-phase signal to phase locked loop (PLL) circuitry so as to create a PLL signal responsive to the frequency of said two-phase signal.

Claim 8. The method of claim 7, wherein said processing further includes processing said PLL signal so as to create a two-phase unity signal responsive to the frequency of said PLL signal.

Claim 9. The method of claim 8, wherein said processing further includes combining said unity signal and said two-phase signal so as to create said indication result.

Claim 10. The method of claim 8, wherein said determining includes comparing said unity signal with said two-phase signal so as to determine the frequency error of said two-phase signal.

Claim 11. The method of claim 8, wherein said indication result is responsive to the frequency of said unity signal.

Claim 12. The method of claim 6, wherein said indication result is responsive to the frequency of said two-phase signal.

Claim 13. The method of claim 6, wherein said processing said traction motor signal includes determining the magnitude of said two-phase signal.

Claim 14. The method of claim 13, wherein said processing includes creating said indication result wherein said indication result is responsive to the magnitude of said two-phase signal.

Claim 15. The method of claim 1, wherein processing said traction motor signal includes isolating a single phase of said traction motor signal.

Claim 16. The method of claim 15, wherein processing said traction motor signal includes applying said single phase of said traction motor signal to a rectifier so as to create a rectified signal.

Claim 17. The method of claim 16, wherein processing said traction motor signal includes applying said rectified signal to a low pass filter so as to create an indication result responsive to the magnitude of said single phase of said traction motor signal.

Claim 18. The method of claim 15, wherein processing said traction motor signal includes processing said single phase of said traction motor signal so as to create said indication result responsive to the magnitude of said single phase of said traction motor signal.

Claim 19. The method of claim 15, wherein processing said traction motor signal includes determining the time between predefined signal event occurrences so as to create an indication result responsive to the frequency of said signal phase of said traction motor signal.

Claim 20. The method of claim 1, wherein processing said traction motor signal includes processing said traction motor signal so as to create said indication result responsive to the frequency of said traction motor signal.

Claim 21. The method of claim 15, wherein said processing said traction motor signal includes calculating said indication result using fourier analysis, wherein said indication result is responsive to the magnitude and frequency spectrum of said traction motor signal.

Claim 22. The method of claim 15, wherein said processing said traction motor signal includes obtaining a vehicle data signal and applying said single phase of said traction motor signal to a band pass filter so as to create a band pass output signal responsive to said vehicle data signal.

Claim 23. The method of claim 22, wherein said processing said traction motor signal includes applying said band pass output signal to a signal rectifier so as to create a rectified signal.

Claim 24. The method of claim 23, wherein said processing said traction motor signal includes applying said rectified signal to a low pass filter so as to create said indication result wherein said indication result is responsive to the magnitude and frequency of said single phase of said traction motor signal.

Claim 25. The method of Claim 1 wherein said rotational velocity of said traction motor is indicative of a velocity of said vehicle.

Claim 26. The method of claim 1 wherein said traction motor is connected to an axle of said vehicle and the method further comprises determining if a locked axle condition exists.

Claim 27. The method of claim 1, further comprising determining at least one of: determination of speed of said vehicle, vehicle adhesion control, vehicle speed control, and wheel diameter determination based on said indication result.

Claim 28. The method of claim 1 wherein said traction motor signal is based on a voltage generated by a residual flux in said traction motor when rotated by movement of said vehicle.

Claim 29. A data storage medium including instructions encoded in a computer readable form for causing a computer to implement a process for detecting a rotational velocity of a traction motor in a vehicle comprising:

obtaining a traction motor signal having at least one phase, wherein said traction motor signal is responsive to an operating condition of said traction motor in an electrically unexcited state;

processing said traction motor signal to create an indication result responsive to a frequency of said traction motor signal; and

determining rotational velocity of said traction motor based on said indication result.

Claim 30. A computer data signal encoded in a computer readable medium, said data signal comprising code configured to direct a computer to implement a process for detecting a rotational velocity of a traction motor in a vehicle comprising:

obtaining a traction motor signal having at least one phase, wherein said traction motor signal is responsive to an operating condition of said traction motor in an electrically unexcited state;

processing said traction motor signal to create an indication result responsive to a frequency of said traction motor signal; and

determining rotational velocity of said traction motor based on said indication result.

Claim 31. A computer processor on a vehicle for performing a process for detecting a rotational velocity of a traction motor in a vehicle comprising:

obtaining a traction motor signal having at least one phase, wherein said traction motor signal is responsive to an operating condition of said traction motor in an electrically unexcited state;

processing said traction motor signal to create an indication result responsive to a frequency of said traction motor signal; and

determining rotational velocity of said traction motor based on said indication result.

Claim 32. A system for detecting a rotational velocity of a traction motor in a vehicle comprising:

a traction motor generating a traction motor signal having at least one phase, wherein said traction motor signal is responsive to an operating condition of said traction motor in an electrically unexcited state;

a voltage sensor configured to generate a signal indicative a voltage generated by residual flux in said traction motor when rotated by movement of said vehicle with said traction motor in an electrically unexcited state; and

a controller in operable communication with at least one of said traction motor and said voltage sensor configured to process said traction motor signal and said signal, and thereby create an indication result responsive to a frequency of said traction motor signal and indicative of rotational velocity of said traction motor.

IX. EVIDENCE APPENDIX

There is no evidence submitted pursuant to 37 C.F.R. §1.130, 37 C.F.R. §1.131, or 37 C.F.R. §1.132. A copy of Becerra ("Four-Quadrant Sensorless Brushless ECM Drive," CH2992-6/91/0000-0202, 1991 IEEE) relied upon by the Examiner for the rejections and relied upon by the Appellant in this appeal is included.

X. RELATED PROCEEDING APPENDIX

There are no other related appeals or interferences known to Appellant, Appellant's legal representatives, or assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.